smp engineers, llc.

Civil Engineers - Surveyors

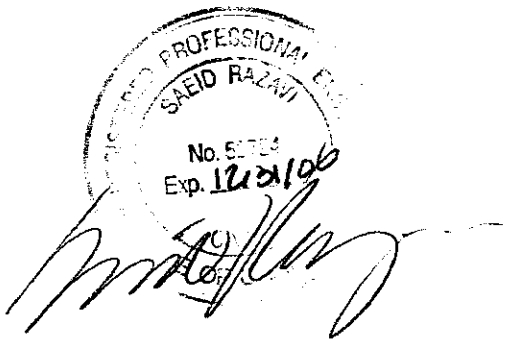
# STORMWATER PROVISION C.3 COMPLIANCE CALCULATIONS

**SANTA CLARA SQUARE**
**LOCATED AT THE CORNER OF**
**ELCAMINO REAL AND LAWRENCE EXPRESSWAY**
**SANTA CLARA CA**

PREPARED BY

SMP ENGINEERS LLC
SAEID RAZAVI

November, 03 2005

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## DRAINAGE PATTERNS:

**AREA #1 (3.77) ACRES:** The majority of the storm drainage water will be directed to the grass pavers fire lane area, by direct discharge overland and over pervious pavement, through roof downspouts, or through collection by drainage inlets connected to inlets within the grass pavers area to this area. Under the grass pavers there will be a perforated plastic pipe to further clean the water before any connection to the city system (see detail).

**AREA #2 (2.88) ACRES:** The majority of the storm drainage water will be directed to the grass pavers fire lane area, by direct discharge overland and over pervious pavement, through roof downspouts, or through collection by drainage inlets connected to inlets within the grass pavers area to this area. . Under the grass pavers there will be a perforated plastic pipe to further clean the water before any connection to the city system (see detail).

**AREA #3 (2.67) ACRES:** The majority of the storm drainage water will be directed to the drainage inlets, by direct discharge overland and over pervious pavement, to inlets within the pervious pavement areas connected to the other drainage systems or city drainage systems. Under the pavement there will be a perforated plastic pipe to further clean the water before any connection to the city system (see detail).

**AREA #4 (3.27) ACRES:** The majority of the storm drainage water will be directed to the drainage inlets, by direct discharge overland and over pervious pavement, to inlets within the pervious pavement areas connected to the other drainage systems or city drainage systems. Under the pavement there will be a perforated plastic pipe to further clean the water before any connection to the city system (see detail).

# CITY OF SANTA CLARA GUIDANCE:
# SELECTING TREATMENT BMPS FOR DEVELOPMENT PROJECTS

| PROJECT TYPE | PREFERRED TREATMENT BMPs |
|---|---|
| **I. Residential** | |
| A. New single-family home (not part of a common plan of development) | N.A. |
| B. Single family home subdivision | • Vegetated swales / filter strips<br>• Microdetention in landscaping<br>• Pervious paving<br>• Bioretention facilities<br>• Extended dry detention basins |
| C. Multi-family residential complex | **See Treatment Control BMPs in 'I-B', above & add:**<br>• Roof gardens (containers) to treat rooftop runoff<br>• Manufactured treatment unit* if needed |
| **II. Commercial** | |
| A. Single commercial office building or church | • Vegetated swales<br>• Microdetention in landscaping<br>• Pervious paving<br>• Bioretention facilities<br>• Roof gardens to treat rooftop runoff |
| B. Research park | • Vegetated swales / filter strips<br>• Microdetention in landscaping<br>• Pervious paving<br>• Bioretention facilities<br>• Roof gardens to treat rooftop runoff<br>• Detention/retention basins |
| C. Shopping center (strip, mall) | • Vegetated swales<br>• Pervious paving<br>• Bioretention facilities<br>• Roof gardens to treat rooftop runoff<br>• Detention/retention basins<br>• Manufactured treatment unit* if needed |
| D. Food service facility (restaurant, cafeteria, supermarket/deli, food preparation) | • Vegetated swales<br>• Bioretention facilities<br>• Manufactured treatment unit* if needed |

# CITY OF SANTA CLARA GUIDANCE:
# SELECTING TREATMENT BMPS FOR DEVELOPMENT PROJECTS

| PROJECT TYPE | PREFERRED TREATMENT BMPs |
|---|---|
| E. Parking lots (> 8 spaces) | • **Vegetated swales**<br>• **Pervious paving**<br>• Bioretention facilities<br>• Detention/retention basins<br>• Manufactured treatment unit*<br>• **Catch basin inlet filters (if other controls not feasible)** |
| **III. Industrial** | |
| A. Industrial building (manufacturing, machine shop, plating, coating, painting, loading dock areas)<br>[Note: if front office is drained away from industrial activities, can use BMPs for commercial office building to treat runoff from that part of site.] | • Detention/retention basins with pretreatment<br>• Manufactured treatment unit*<br>• Catch basin inlet filters (if other controls not feasible) |
| **IV. Auto-Related Facilities** | |
| A. Auto-related facility (gas station/fueling, vehicle/equip. repair, steam cleaning, fleet service, car washing)<br>[Note: if front office is drained away from automotive activities, can use BMPs for commercial office building to treat runoff from that part of site.] | • Trench drain adjacent to work area, draining to oil/water separator and sanitary sewer<br>• Manufactured treatment unit*<br>• Catch basin inlet filters (if other controls not feasible)<br>• Other treatment BMPs as described in the *"CASQA BMP Handbook"* |

Notes:

Treatment BMPs do not include the site design and source control measures that should be considered for each site.

*A manufactured treatment unit can be a media filtration device (such as a sand filter) or a hydrodynamic separator that is appropriate for removal of expected pollutants

References:

SCVURPPP C.3 Handbook (draft May 2003)

CASQA BMP Handbook for New Development and Redevelopment, 2003

City of Cupertino Draft BMP Selection Matrix (credit to Genevieve Fire, P.E.)

## I. Applicability

1. Has the project application been deemed complete prior to October 15, 2003?

____ Yes ___X_ No

*If Yes, then the requirements are not applicable to the project. Do not continue.*

2. Does the project[1] create or replace one acre (43,560 square feet) or more of impervious surface? (See the Impervious Surface Data form)

_X___ Yes ____ No

*If No, then the requirements are not applicable to the project. Do not continue with this worksheet.*

*If Yes, and the project is a new development, then the project must incorporate treatment measures per Provision C.3 of the SCVURPPP NPDES permit.*

3. Is the project a redevelopment project?

__X__ Yes ____ No (go to Section II.)

If Yes:

3a. Will the project result in an increase or replacement of more than 50% of the impervious surface from the previously existing development[2]?

__X__ Yes _ _ No

*If Yes, then the entire project must be included in the treatment measure design.*

*If No, then only the redeveloped portion must be included in the design of treatment measures.*

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[1] Includes all public and private commercial, industrial, or residential developments, streets, roads, highways, and freeways or significant redevelopment projects under the City's jurisdiction. Impervious surface areas include roofs, streets, sidewalks and/or any newly constructed paved surface used for motorized vehicles.

[2] Interior remodels and routine maintenance or repair, including roof or exterior surface replacement and repaving, are excluded.

## II. Type of Treatment Measure Proposed for Project

1. Does the treatment measure (or part of a series of measures) operate based on the volume of water treated (i.e., detains an amount of runoff for a certain amount of time to allow solids and pollutants to settle to the bottom)? (See Table 1 for examples.)

_X__ Yes ____ No

*If Yes, continue to Section III.—Sizing for Volume-Based Treatment Controls on page 3.*
*If No, continue to next question.*

2. Does the treatment measure (or part of a series of measures) operate based on continuous flow of runoff through the device? (See Table 1 for examples.)

___ Yes __X__ No

*If Yes, continue to Section IV.—Sizing for Flow-Based Treatment Controls on page 5.*

**Table 1: Examples Volume-based and Flow-based Controls**

| Volume-based Controls | Flow-based Controls | Volume & Flow-Based |
|---|---|---|
| Extended detention (dry) ponds | **Vegetated swales** | **Bioretention areas** |
| **Wet ponds** | Vegetated buffer strips | Constructed wetlands |
| **Infiltration trench** | Sand filters | |
| | Several proprietary units (e.g., wet vaults, vortex separators, **inlet filters**, media filters) | |

## III. City of Santa Clara Simplified Method for Sizing Volume-Based Controls

The SCVURPPP permit allows two methods for sizing volume-based controls—the Urban Runoff Quality Management method (URQM Method) or the California Stormwater Best Management Practice[3] (BMP) Handbook Method. The City of Santa Clara has selected a preferred method from these two to conduct sizing of volume-based controls. The simplified method is based on several assumptions and uses parameters specific to the City of Santa Clara. Applicants are allowed to use the other options allowed in the permit only if they provide extra documentation (and a fee) for the additional review required (please see Attachment A for directions for using alternative options allowed within the SCVURPPP permit).

The simplified method utilizes the California BMP Handbook Method, adapted based on local conditions, and the San Jose rain gauge curves. This simplified approach makes the following assumptions:

A. The project site slopes are close to 1% or less.

B. The soils are either clay or heavily compacted.

The equation that will be used to size the BMP is:

BMP Volume = (Correction Factor) X (Unit Storage) X (Drainage Area to the BMP)

**Step 1**: Determine the percent imperviousness of the area draining to the BMP.

a. Determine the drainage area for the BMP: _12.5____ acres

b. Determine the amount of impervious surface area in the drainage area: _9.66___ acres

c. Determine percent imperviousness of the drainage area: 77.3_____%

% impervious area = (amount of impervious area/drainage area for the BMP) X 100

% impervious area = _77.3%_____

**Step 2**: Find the unit storage volume for capture of 80% of annual runoff (inches)—assuming clay soil and ≤1% slope.

a. Using the site imperviousness value from Step 1.c. above and Table 2 below, obtain the unit storage volume. _0.51_____(inches)

[3] For the purpose of this worksheet, a stormwater best management practice, or BMP, is the same as a stormwater treatment measure or device.

**Table 2: Unit Storage Volume for 80% Capture**[4]
*(assuming 1% slope, San Jose Airport Rain Gauge, clay soils)*

| Percent Site Imperviousness | Unit Basin Storage for 80% Capture (inch) |
|---|---|
| 30% | 0.36 |
| 35% | 0.37 |
| 40% | 0.38 |
| 45% | 0.39 |
| 50% | 0.40 |
| 55% | 0.42 |
| 60% | 0.44 |
| 65% | 0.46 |
| 70% | 0.47 |
| 75% | 0.49 |
| 80% | 0.51 |
| 85% | 0.53 |
| 90% | 0.55 |
| 95% | 0.57 |
| 100% | 0.58 |

[4] *Source: GeoSyntec Consultant, SCVURPPP Sizing Criteria Report, Figure 3-A: "Unit Basin Volume for 80% Capture," draft May 2003.*

**Step 3**: Determine the mean annual rainfall at the site to determine the correction factor.

a. Locate the project site on Figure 1. Estimate the mean annual rainfall at the location of the project: _14.5____inches

(Each line on Figure 1, called a rainfall isopleth, indicates locations where the same amount of rainfall falls on average each year (e.g., the isopleth marked 14 indicates that areas crossed by this line average 14 inches of rainfall per year). If the project location is between two lines, estimate the mean annual rainfall depending on the location of the site—your estimate should be between 13 and 16 inches.)

b. The San Jose Airport gauge is the nearest rain gauge. Its mean annual rainfall is 13.9 inches. Determine the correction factor for the rainfall at the site using the information from Step 2.a., and the San Jose Airport rain gauge.

Correction Factor = mean annual rainfall at the site (from Step 3.a.)/13.9 inches

Correction Factor: __1.04_____

**Step 4**: Size the BMP, using the following equation:

BMP Volume = (Correction Factor) X (Unit Storage Volume) X (Drainage Area to BMP)

BMP Volume = (Step 3.b.) X (Step 2.a. (inches)) X (Step 1.a. (acres)) / 12 in./ft.

**BMP Volume = _____ acre-feet**

AREA 1= (1.04 X 0.51 X 3.77 Acres)/ 12 inch/feet = **0.166 acres-ft**= 7,230 CF

AREA 2= (1.04 X 0.51 X 2.88 Acres)/ 12 inch/feet = **0.127 acres-ft**= 5,532 CF

AREA 3= (1.04 X 0.51 X 2.67 Acres)/ 12 inch/feet = **0.12 acres-ft**= 5,227 CF

AREA 4= (1.04 X 0.51 X 3.27 Acres)/ 12 inch/feet = **0.144 acres-ft**= 6,272 CF

## ALTERNATE CALCULATION TO SHOW FLOW BASE TREATMENT (AREA 1)

### IV. City of Santa Clara Simplified Method for Sizing Flow-Based Treatment Measures

The SCVURPPP permit allows three methods for sizing flow-based treatment measures—the Factored Flood Flow Method (10% of the 50-year peak rainfall intensity); the California BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85$^{th}$ percentile hourly rainfall intensity); or the Uniform Intensity method (the flow produced by a rain event equal to 0.2 inches/hour). The City of Santa Clara has selected the California BMP Handbook Method for sizing of flow-based controls. Applicants are allowed to use one of the other options if they provide extra documentation (and a fee) for the additional review required (please see Attachment A for directions for using alternative options allowed within the SCVURPPP permit).

**California BMP Handbook Flow Approach**

The design rainfall intensity (I) is twice the 85$^{th}$ percentile value. The 85$^{th}$ percentile hourly rainfall intensity for San Jose Airport rain gauge is 0.087 in /hr. **Therefore, the design intensity is <u>0.17 in /hr</u> for San Jose and is appropriate for use in Santa Clara.**

The intensity represents the rate of rainfall (a depth per hour) and needs to be converted to a flow of runoff from the drainage area to the BMP.

The flow is calculated using the rational formula Q = CIA, where:

Q is the flow in cubic feet per second (cfs),

C is the runoff coefficient of the drainage area to the BMP

I is the design intensity (in/hr), and

A is the area <u>draining to the BMP</u> (acres)

**Step 1.** Determine the drainage area (A) for the BMP in acres: ____3.77_____ ac.

**Step 2.** Determine the amount of impervious area draining to the BMP (acres):
_____2.78____ac.

**Step 3.** Determine the impervious ratio, *i:* (not the same as "I", the rainfall intensity)

*i* = (percent imperviousness of drainage area for BMP)/100
-- OR --
*i* = amount of impervious area (acres)/drainage area for the BMP (A) (acres)

*i* = __0.74_____0.75 (range will be from 0-1)

**Step 4.** Determine the runoff coefficient, C, using **Table 3** at the end of this section **OR** the following equation, where $i$ = impervious ratio from **Step 3**.

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

C = _____0.54_____

**Step 5.** Determine the design flow (Q) using Q = CIA, where C is the runoff coefficient, I is the design intensity (in/hr), and A is the drainage area for the BMP (acres)

Q = CIA = (Runoff Coefficient) X (Rainfall intensity) X (Drainage area to the BMP)

Q = (**Step 4**) X (0.17 in/hr) X (**Step 1** (acres))

**Q = ____0.35_____cfs** [5]

## ALTERNATE CALCULATION TO SHOW FLOW BASE TREATMENT (AREA 2)

### V. City of Santa Clara Simplified Method for Sizing Flow-Based Treatment Measures

The SCVURPPP permit allows three methods for sizing flow-based treatment measures—the Factored Flood Flow Method (10% of the 50-year peak rainfall intensity); the California BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity); or the Uniform Intensity method (the flow produced by a rain event equal to 0.2 inches/hour). The City of Santa Clara has selected the California BMP Handbook Method for sizing of flow-based controls. Applicants are allowed to use one of the other options if they provide extra documentation (and a fee) for the additional review required (please see Attachment A for directions for using alternative options allowed within the SCVURPPP permit).

**California BMP Handbook Flow Approach**

The design rainfall intensity (I) is twice the 85th percentile value. The 85th percentile hourly rainfall intensity for San Jose Airport rain gauge is 0.087 in /hr. **Therefore, the design intensity is 0.17 in /hr for San Jose and is appropriate for use in Santa Clara.**

The intensity represents the rate of rainfall (a depth per hour) and needs to be converted to a flow of runoff from the drainage area to the BMP.

The flow is calculated using the rational formula Q = CIA, where:

Q is the flow in cubic feet per second (cfs),

[5] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq.ft/acre) X (1ft/12 in) X (1hr/3600 sec) = 1 $ft^3$/ sec or cfs.

C is the runoff coefficient of the drainage area to the BMP

I is the design intensity (in/hr), and

A is the area draining to the BMP (acres)

**Step 1.** Determine the drainage area (A) for the BMP in acres: ____2.88_____ ac.

**Step 2.** Determine the amount of impervious area draining to the BMP (acres):
_____2.18____ac.

**Step 3.** Determine the impervious ratio, *i:* (not the same as "I", the rainfall intensity)

*i* = (percent imperviousness of drainage area for BMP)/100
-- OR --
*i* = amount of impervious area (acres)/drainage area for the BMP (A) (acres)

*i* = ___0.75_____0.75 (range will be from 0-1)

**Step 4.** Determine the runoff coefficient, C, using **Table 3** at the end of this section **OR** the following equation, where *i* = impervious ratio from **Step 3.**

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

C = _____0.54_____

**Step 5.** Determine the design flow (Q) using Q = CIA, where C is the runoff coefficient, I is the design intensity (in/hr), and A is the drainage area for the BMP (acres)

Q = CIA = (Runoff Coefficient) X (Rainfall intensity) X (Drainage area to the BMP)

Q = (**Step 4**) X (0.17 in/hr) X (**Step 1** (acres))

**Q = ____0.26_____cfs** [6]

## ALTERNATE CALCULATION TO SHOW FLOW BASE TREATMENT (AREA 3)

### VI. City of Santa Clara Simplified Method for Sizing Flow-Based Treatment Measures

The SCVURPPP permit allows three methods for sizing flow-based treatment measures—the Factored Flood Flow Method (10% of the 50-year peak rainfall intensity); the California BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity); or the Uniform Intensity method (the flow produced by a rain event equal to 0.2 inches/hour). The City of Santa Clara has selected the California BMP Handbook Method for sizing of flow-based controls. Applicants are allowed to use one of the other options

[6] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq.ft/acre) X (1ft/12 in) X (1hr/3600 sec) = 1 $ft^3$/ sec or cfs.

if they provide extra documentation (and a fee) for the additional review required (please see Attachment A for directions for using alternative options allowed within the SCVURPPP permit).

**California BMP Handbook Flow Approach**

The design rainfall intensity (I) is twice the 85th percentile value. The 85th percentile hourly rainfall intensity for San Jose Airport rain gauge is 0.087 in /hr. **Therefore, the design intensity is 0.17 in /hr for San Jose and is appropriate for use in Santa Clara.**

The intensity represents the rate of rainfall (a depth per hour) and needs to be converted to a flow of runoff from the drainage area to the BMP.

The flow is calculated using the rational formula Q = CIA, where:

Q is the flow in cubic feet per second (cfs),

C is the runoff coefficient of the drainage area to the BMP

I is the design intensity (in/hr), and

A is the area draining to the BMP (acres)

**Step 1.** Determine the drainage area (A) for the BMP in acres: 2.67 ac.

**Step 2.** Determine the amount of impervious area draining to the BMP (acres): 2.16 ac.

**Step 3.** Determine the impervious ratio, *i:* (not the same as "I", the rainfall intensity)

*i* = (percent imperviousness of drainage area for BMP)/100

-- OR --

*i* = amount of impervious area (acres)/drainage area for the BMP (A) (acres)

*i* = 0.80 (range will be from 0-1)

**Step 4.** Determine the runoff coefficient, C, using **Table 3** at the end of this section OR the following equation, where *i* = impervious ratio from **Step 3**.

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

C = 0.60

**Step 5.** Determine the design flow (Q) using Q = CIA, where C is the runoff coefficient, I is the design intensity (in/hr), and A is the drainage area for the BMP (acres)

Q = CIA = (Runoff Coefficient) X (Rainfall intensity) X (Drainage area to the BMP)

Q = (**Step 4**) X (0.17 in/hr) X (**Step 1** (acres)

Q = ____0.27_____cfs [7]

## ALTERNATE CALCULATION TO SHOW FLOW BASE TREATMENT (AREA 4)

### VII. City of Santa Clara Simplified Method for Sizing Flow-Based Treatment Measures

The SCVURPPP permit allows three methods for sizing flow-based treatment measures—the Factored Flood Flow Method (10% of the 50-year peak rainfall intensity); the California BMP Handbook Method (the flow produced by a rain event equal to at least 2 times the 85th percentile hourly rainfall intensity); or the Uniform Intensity method (the flow produced by a rain event equal to 0.2 inches/hour). The City of Santa Clara has selected the California BMP Handbook Method for sizing of flow-based controls. Applicants are allowed to use one of the other options if they provide extra documentation (and a fee) for the additional review required (please see Attachment A for directions for using alternative options allowed within the SCVURPPP permit).

**California BMP Handbook Flow Approach**

The design rainfall intensity (I) is twice the 85th percentile value. The 85th percentile hourly rainfall intensity for San Jose Airport rain gauge is 0.087 in /hr. **Therefore, the design intensity is 0.17 in /hr for San Jose and is appropriate for use in Santa Clara.**

The intensity represents the rate of rainfall (a depth per hour) and needs to be converted to a flow of runoff from the drainage area to the BMP.

The flow is calculated using the rational formula Q = CIA, where:

Q is the flow in cubic feet per second (cfs),

C is the runoff coefficient of the drainage area to the BMP

I is the design intensity (in/hr), and

A is the area draining to the BMP (acres)

**Step 1.** Determine the drainage area (A) for the BMP in acres: ____3.27_____ ac.

**Step 2.** Determine the amount of impervious area draining to the BMP (acres): _____2.57____ac.

**Step 3.** Determine the impervious ratio, *i:* (not the same as "I", the rainfall intensity)

*i* = (percent imperviousness of drainage area for BMP)/100

-- OR --

[7] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq.ft/acre) X (1ft/12 in) X (1hr/3600 sec) = 1 $ft^3$/ sec or cfs.

$i$ = amount of impervious area (acres)/drainage area for the BMP (A) (acres)

$i$ = _____0.78 (range will be from 0-1)

**Step 4.** Determine the runoff coefficient, C, using **Table 3** at the end of this section **OR** the following equation, where $i$ = impervious ratio from **Step 3**.

$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$

C = _____0.6_____

**Step 5.** Determine the design flow (Q) using Q = CIA, where C is the runoff coefficient, I is the design intensity (in/hr), and A is the drainage area for the BMP (acres)

Q = CIA = (Runoff Coefficient) X (Rainfall intensity) X (Drainage area to the BMP)

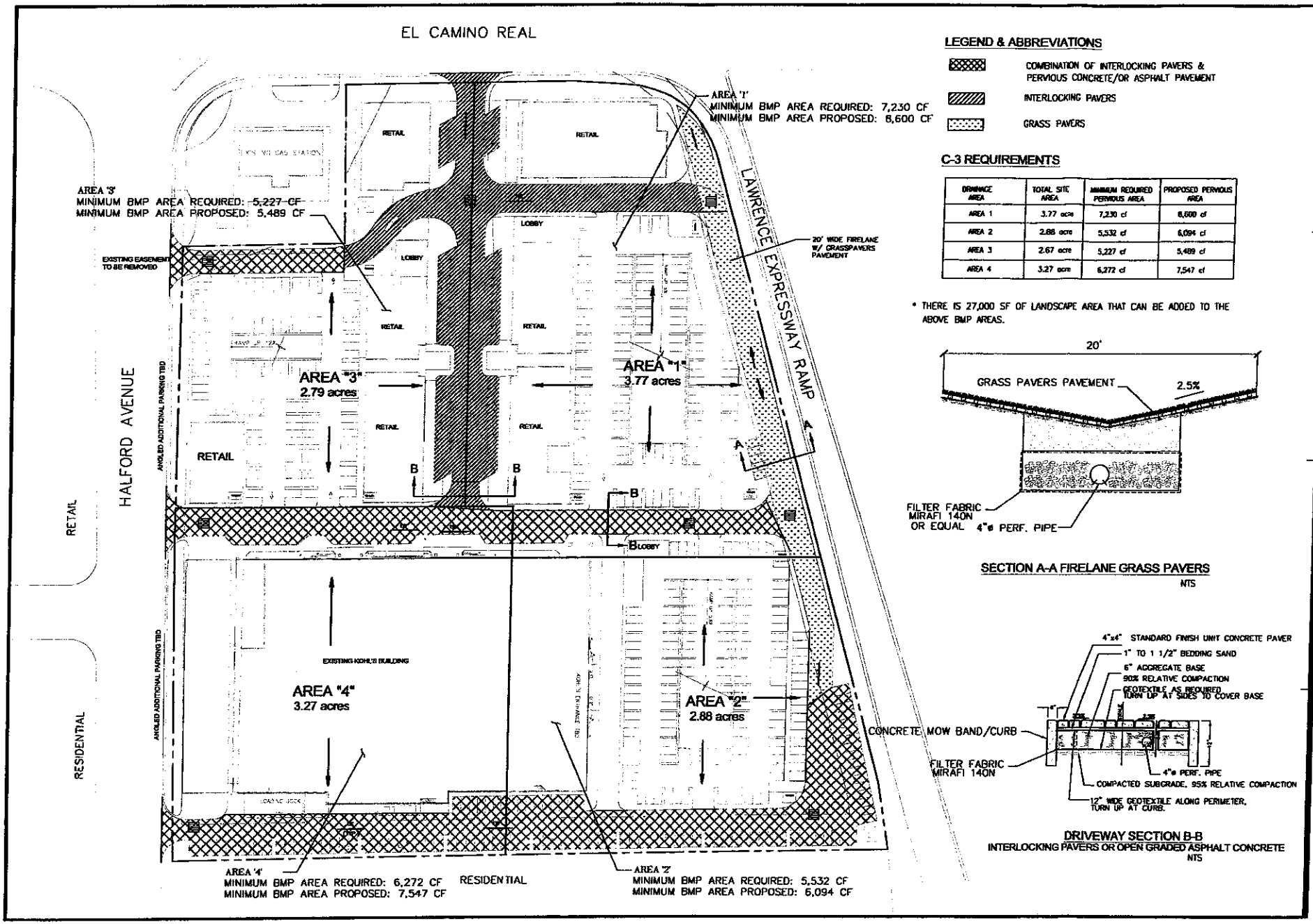
Q = (**Step 4**) X (0.17 in/hr) X (**Step 1** (acres))

**Q = ____0.33_____cfs** [8]

**Table 3: Runoff Coefficients "C"**

| Site Imperviousness ($i$) | Runoff Coefficient C |
|---|---|
| 0.00 | 0.04 |
| 0.05 | 0.08 |
| 0.10 | 0.11 |
| 0.15 | 0.14 |
| 0.20 | 0.17 |
| 0.25 | 0.20 |
| 0.30 | 0.23 |
| 0.35 | 0.25 |
| 0.40 | 0.28 |
| 0.45 | 0.31 |
| 0.50 | 0.34 |
| 0.55 | 0.37 |
| 0.60 | 0.41 |
| 0.65 | 0.45 |
| 0.70 | 0.49 |
| 0.75 | 0.54 |
| 0.80 | 0.60 |
| 0.85 | 0.66 |
| 0.90 | 0.73 |
| 0.95 | 0.81 |
| 1.00 | 0.89 |

[8] No conversion factor for correct units is needed for the rational formula because (1 acre-in/hr) X (43,560 sq.ft/acre) X (1ft/12 in) X (1hr/3600 sec) = 1 $ft^3$/ sec or cfs.




## LEGEND & ABBREVIATIONS

- COMBINATION OF INTERLOCKING PAVERS & PERVIOUS CONCRETE/OR ASPHALT PAVEMENT
- INTERLOCKING PAVERS
- GRASS PAVERS

## C-3 REQUIREMENTS

| DRAINAGE AREA | TOTAL SITE AREA | MINIMUM REQUIRED PERVIOUS AREA | PROPOSED PERVIOUS AREA |
|---|---|---|---|
| AREA 1 | 3.77 acre | 7,230 cf | 8,600 cf |
| AREA 2 | 2.88 acre | 5,532 cf | 6,094 cf |
| AREA 3 | 2.67 acre | 5,227 cf | 5,489 cf |
| AREA 4 | 3.27 acre | 6,272 cf | 7,547 cf |

* THERE IS 27,000 SF OF LANDSCAPE AREA THAT CAN BE ADDED TO THE ABOVE BMP AREAS.




SECTION A-A FIRELANE GRASS PAVERS
NTS




DRIVEWAY SECTION B-B
INTERLOCKING PAVERS OR OPEN GRADED ASPHALT CONCRETE
NTS

SMP ENGINEERS
CIVIL ENGINEERS

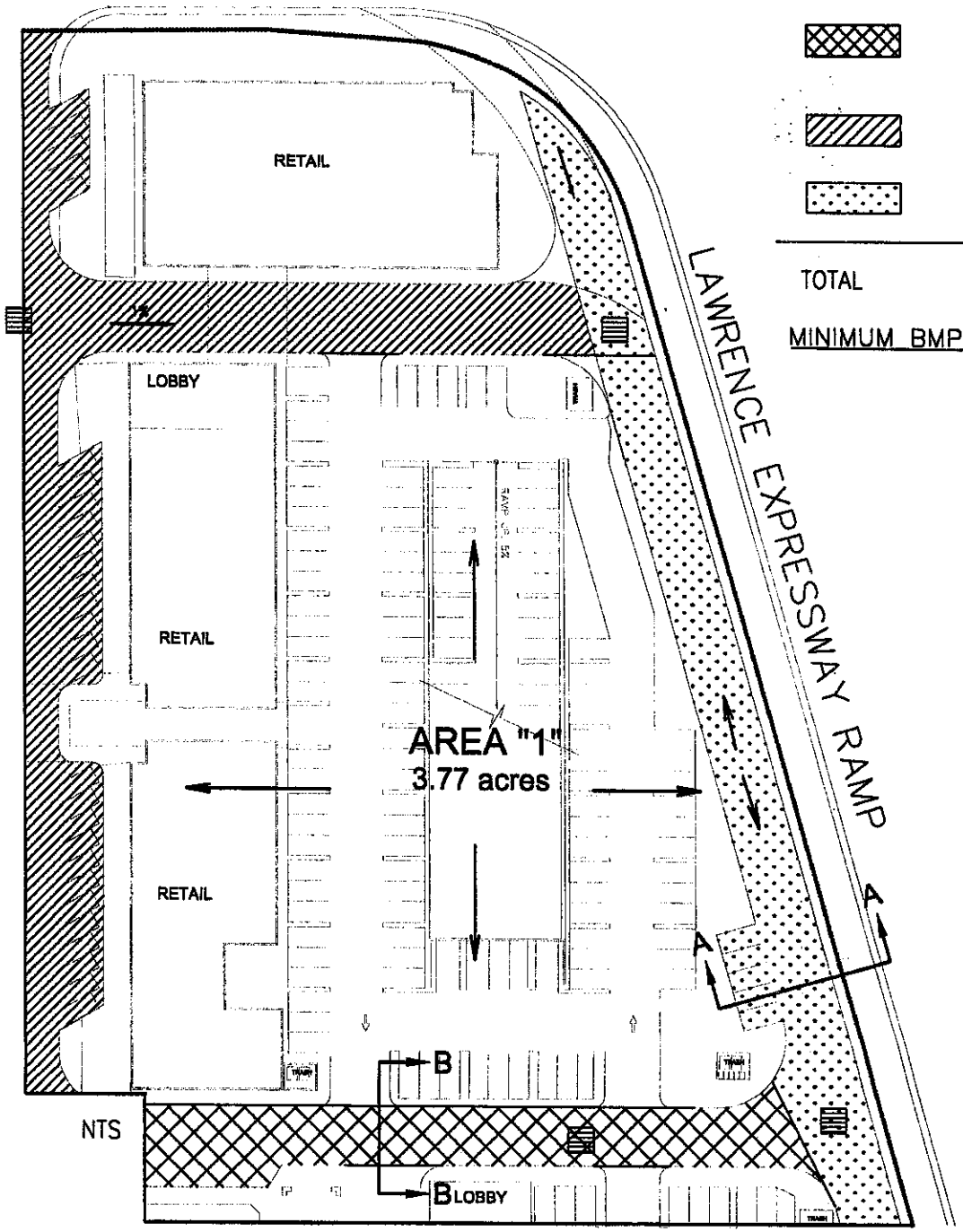
OWNER:



SANTA CLARA SQUARE
3600 ELCAMINO REAL
SANTA CLARA, CALIFORNIA
STORM WATER RETENTION AREAS

APN 313-06-002 AND 004

Date: NOVEMBER 03, 2005
Scale: NTS
Prepared by: S.R.
Drawn by: A.M.
Job #: 23113
Sheet:




## AREA "1"

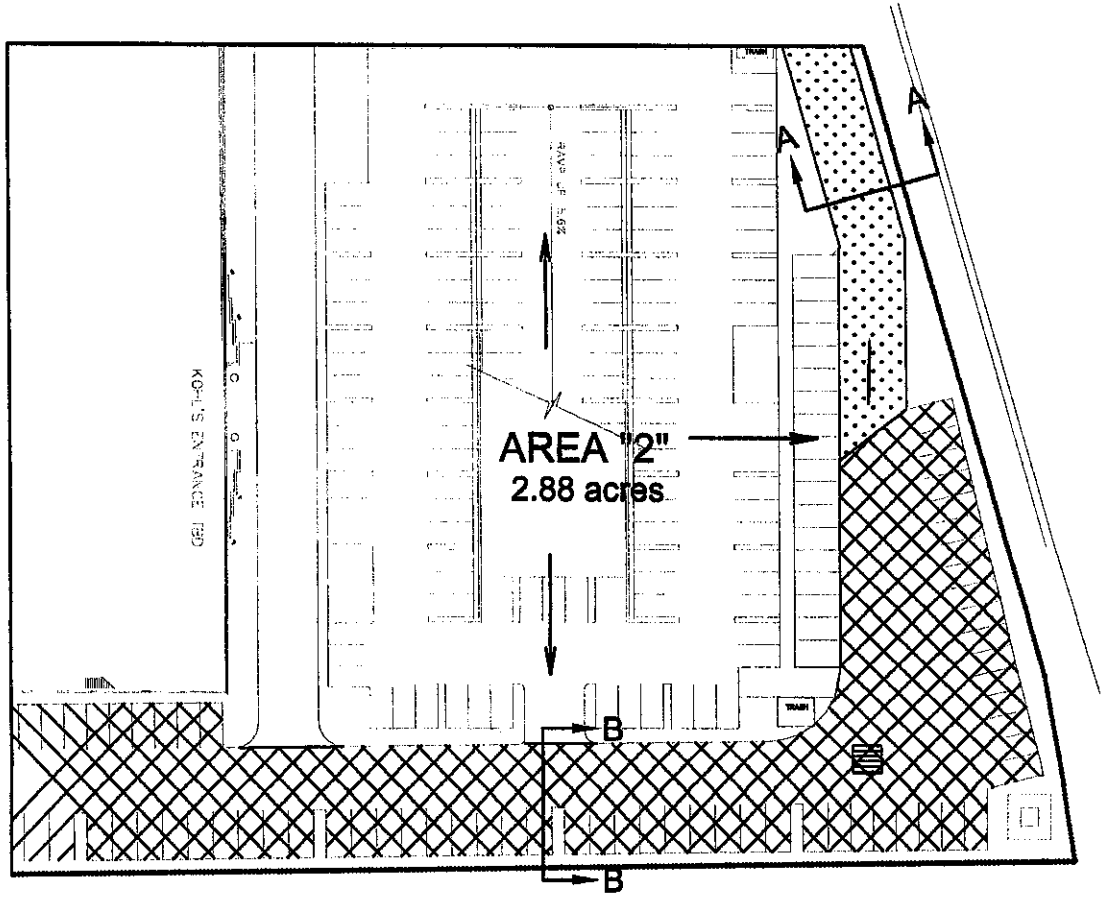
| | | |
|---|---|---|
| 8,689 SF | COMBINATION OF INTERLOCKING PAVERS & PERVIOUS CONCRETE/OR ASPHALT PAVEMENT |
| 19,774 SF | INTERLOCKING PAVERS |
| 14,537 SF | GRASS PAVERS |
| TOTAL 43,000 SF | 43,000 X .2 = 8,600 CF |

MINIMUM BMP AREA PROPOSED: 8,600 CF

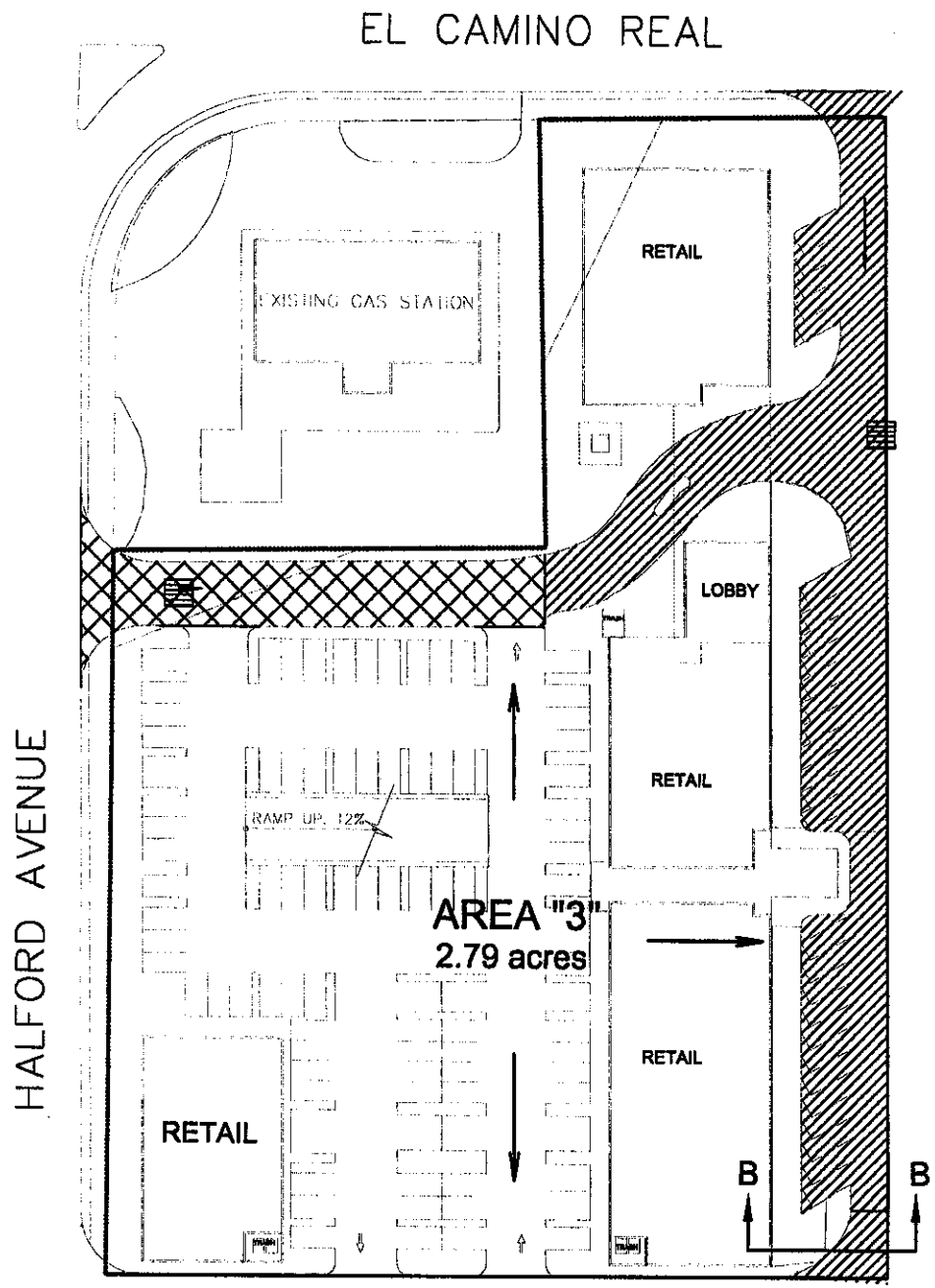
# AREA "2"

| | | |
|---|---|---|
| 26,308 SF | COMBINATION OF INTERLOCKING PAVERS & PERVIOUS CONCRETE/OR ASPHALT PAVEMENT |
| 4,162 SF | GRASS PAVERS |
| TOTAL 30,470 SF | 30,470 X .2 = 6,094 CF |

MINIMUM BMP AREA PROPOSED: 6,094 CF




NTS




## AREA "3"

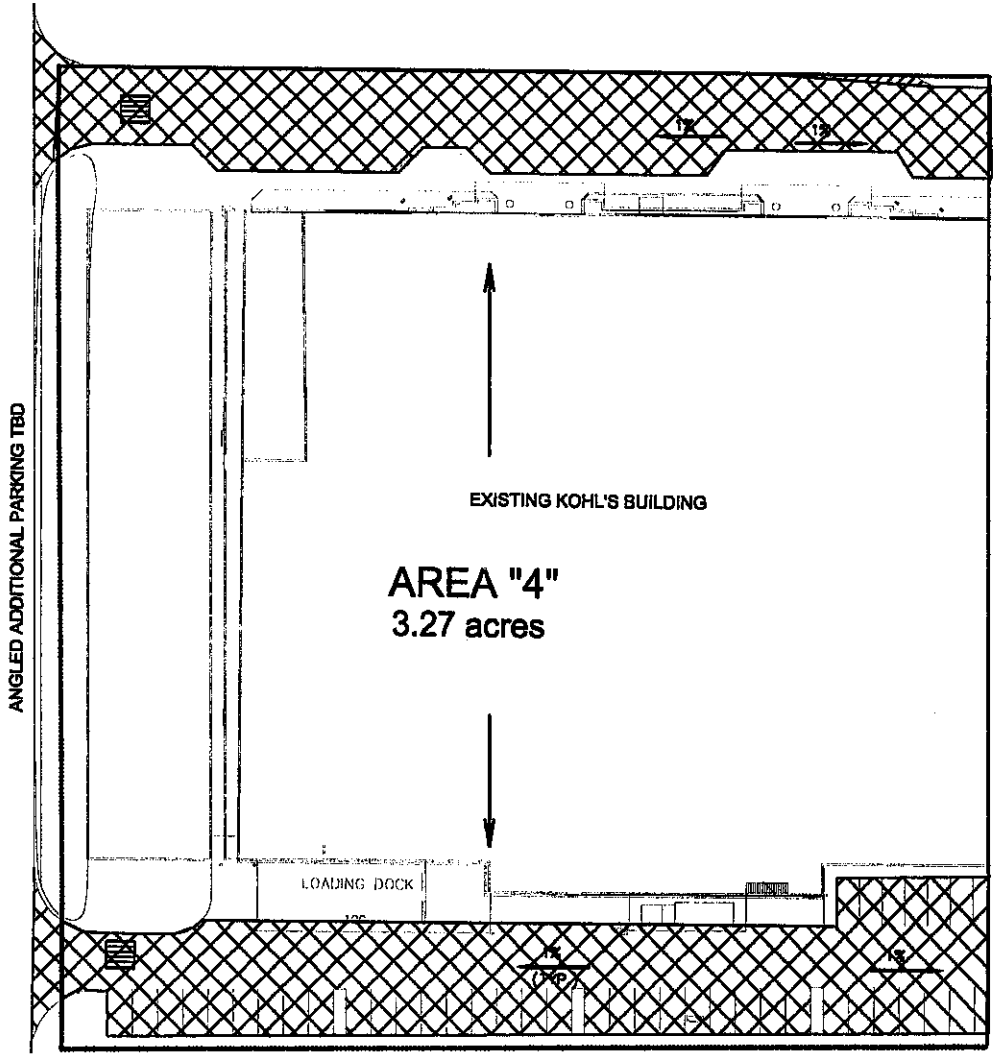
| | | |
|---|---|---|
| | 4,632 SF | COMBINATION OF INTERLOCKING PAVERS & PERVIOUS CONCRETE/OR ASPHALT PAVEMENT |
| | 17,326 SF | INTERLOCKING PAVERS |
| TOTAL | 21,958 SF | 21,958 X .25 = 5,489 CF |

MINIMUM BMP AREA PROPOSED: 5,489 CF

# AREA "4"

| | | |
|---|---|---|
| | 30,188 SF | COMBINATION OF INTERLOCKING PAVERS & PERVIOUS CONCRETE/OR ASPHALT PAVEMENT |
| TOTAL | 30,188 SF | 30,188 X .25 = 7,547 CF |

MINIMUM BMP AREA PROPOSED: 7,547 CF

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